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SOLUTIONS, Inc.

1100 South Waiola Avenue
La Grange, Illinois 60525

PHONE (708) 352-9322
FAX (708) 352-9322

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TO: Michael Cervinka

COMPANY: Arrow Gear

FAX Number: 969-0253

Message

Mike: The following is a draft of the Corrective Action Report for the tank which was removed. Please review this report and I would appreciate any comments or suggestions regarding the content. Thanks. Dana Rose

NOTE: Contact immediately if any pages are illegible or not received. Phone (708) 352-9322

LEAKING UNDERGROUND STORAGE TANK

CORRECTIVE ACTION REPORT

ARROW GEAR COMPANY
Downers Grove, Illinois

IEMA Incident # 930214

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CORRECTIVE ACTION REPORT

DANA,
ERNIE WANTED SOMETHING STATING THAT THE HOLES WERE OPENED ONLY AFTER MANKOFF REMOVED THE TANK, ALLOWING THE MOST SAND, RUST, & SLUDGE TO BREAK LOOSE - THEREFOR THE OIL WASN'T LEAKING WHEN THE TANK WAS IN PLACE.

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1.1 Summary

Arrow (OSFM Facility ID Number 2-001201) owned and operated one 1,000 gallon UST for the purpose of storing Houghto-Quench G (see Appendix 5 - Manufacturer's Safety Data Sheet), an industrial quench oil utilized in the heat treating process of metal gears manufactured on the premises. The UST was located within the heat treating section of the plant building and was removed to facilitate the installation of an additional heat treating furnace.

Arrow contracted the services of Mankoff Equipment Company (Mankoff) of Mundelein, Illinois to excavate and properly dispose of the UST. An "Application for Permit to Remove" was received and approved by the Office of the State Fire Marshall (OSFM) on October 20, 1992 (OSFM Permit # 6810-92REM). Mankoff removed the UST on January 20, 1993 in the presence of Mr. Aaron Siegler (OSFM Representative), Paul Mankoff (Mankoff), Ed Kauzlarich, Harry Hartzell, and Mike Cervinka (Arrow). According to Arrow representatives, stained soils were visible along the load bearing wall foundation on the north face of the excavation and the UST had visible signs of deteriorization (holes and rust). Mr. Siegler determined that a release of product had occurred and the incident was reported to the Illinois Emergency Management Agency (IEMA) on January 21, 1993 (IEMA Incident #930214) by Mr. James E. Pielsticker, Vice President, of Arrow. The UST was removed, cleaned and properly disposed as scrap by Mankoff. A sample for disposal analysis was obtained and excavated materials were placed back into the excavation for proper disposal at a later date.

ERNIE

Arrow retained the services of Adept Environmental Solutions, Inc. (Adept) of La Grange, Illinois to oversee the cleanup process, provide closure documentation, and submit a Corrective Action Report.

A preliminary sample for analysis was acquired from an area along the north load bearing wall where the most visibly stained soils in the tank bed occurred. This sample was analyzed for benzene, toluene, ethyl-benzene, and xylenes (BTEX compounds), and polynuclear aromatic hydrocarbons (PNA's), and toxicity characteristic leaching process for metals (TCLP Metals). The TCLP metals was performed to determine if any metals were present in the quench oil resulting from the heat treat process. The findings of this analysis as depicted in TABLE 5.1 reveal that BTEX and PNA parameters are all below detection limits. The TCLP Metals are all below detection limits with the exception of Barium (a reading of 1800 ppm), however this reading is still below the IEPA Generic Cleanup Objective for soils contaminated with "other petroleum products" (Note that the IEPA generic cleanup objective for barium is 2000 ppm). Based on this analytical, it was determined that metal contamination of the oil is not a factor and therefore wouldd not be analyzed in subsequent clean closure testing.

UST backfill materials were excavated and properly disposed as a special waste solid by ALL Earthmoving, Inc. (All Earth) of Mokena, Illinois on March 11, 1993. Approximately 45 cubic yards of backfill materials (mostly sand) was disposed to the EnvironTech, Inc. landfill facility in Morris, Illinois (Copies of Waste Disposal Manifests are included in Appendix 3) . The excavation and disposal encompassed soils located within the UST tank bed area (Figure 4). Excavation continued until natural soils were encountered.

Six laboratory samples for clean closure analysis (Figure 4) were obtained from the excavation sidewalls and invert. These samples were analyzed for BTEX compounds and PNA's. Results of these samples for clean closure analysis are depicted in TABLE 5.2. Cleanup validation sample results indicated the existence of low level amounts of BTEX compounds which are all well below IEPA generic cleanup objectives for soils contaminated with "other petroleum substances" as outlined in the February 1993 "Leaking Underground Storage Tank Soil Sampling Requirements". Cleanup validation samples also indicated the presence of small amounts of Carcinogenic PNA's including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene that were in excess of IEPA generic cleanup objectives (see TABLE 5.2).

1.2 Conclusions

Analytical results of the six final cleanup validation samples indicate that all parameters are below IEPA generic cleanup objectives for BTEX and PNA's with the exception of Carcinogenic PNA's in all six samples. Residual concentrations for these compounds are relatively low. Arrow Gear herein requests a variance for Carcinogenic PNA's, and that IEPA grant Arrow Gear UST site closure status.

2.0 Background Information

Founded in 1947, Arrow Gear Company is a privately held corporation with 300 plus employees located at three separate facilities. Arrow Gear manufactures high-precision gears for commercial industry, the aerospace industry, and the military through their state of the art Downers Grove plant. Gear blanks are produced at the neighboring American Screw Machine Products Division and the Nebraska based Johnson Gear Division services farm irrigation gear drive systems worldwide.

Throughout Arrow's history, the management team has been committed to expansion and growth. Arrow has strived to attain autonomy of production by facilitating complete "in-house" manufacturing of its products. Specializing in high-tech spiral bevel gearing, the company oversees the complete evolution of its product from inception through final production.

Arrow has continually expanded its facilities since moving to Downers Grove in 1962 and has been a steady employer; providing jobs and support for the community throughout its existence. Arrow has a firm outlook toward a prosperous future.

3.0 Site Conditions

3.1 Geography

Extensive municipal services and good schools have long been the hallmarks of Downers Grove, located approximately 22 miles west of the Chicago Loop in DuPage County. A mix of residential, commercial and industrial properties make up the village which has been recognized for ecological and conservational progress. The village hosts numerous cultural festivals and summer concerts.

The population of Downers Grove according to the 1990 census is about 43,658 people with a median income of $44,962 per family. Approximately 45% of the residents commute to Chicago for employment. The remainder are employed throughout the Downers Grove and Oak Brook area. Downers Grove is unique because it also has about 6,000 industrial jobs within its boundaries with new construction providing more commercial and industrial facilities. The community is currently serviced by well water, but village officials estimate that a switch to Lake Michigan water may be coming soon.

APPROX. MAY '92

LAKE MICH WATER

Arrow Gear Company is located in the industrial south end of the village in Township 38N, Range 10E, Section 12, in DuPage County, Illinois.

Latitude: 41° 47'N, Longitude: 88° 02'E

3.2 Regional Geology

Northeastern Illinois is located within the Central Lowland physiographic province of the United States, and lies within two subdivisions of that province - the Great Lakes Section and the Till Plains Section. The Great Lakes Section consists of a series of north-south trending moranic ridges which roughly parallel the Lake Michigan shoreline (Wheaton Morainal Country). Most major drainways are aligned north-south between the moranic ridges. Immediately adjacent to Lake Michigan, east of moranic ridges, lies a plain that was once the site of the large glacial lake, Lake Chicago. Development of the metropolitan Chicago area has been centered on the Lake Michigan Plain. The Till Plains Section in northeastern Illinois is generally composed of more subdued topography with the moranic ridges not as well defined. Both the moranic uplands and inter-moranic areas are characterized by local drainways which may be irregular and poorly developed. Glacial till, deposited directly by melting glaciers, is the most ubiquitous surface and near-surface deposit. Water-laid, course-textured glacial outwash and fine-textured glacial lake deposits may overlie, underlie, and be interbedded with the various glacial tills in the area (reference 4).

The topography, drainage and unconsolidated deposits in DuPage County are the result of the action of glacial ice and running water. Underlying these unconsolidated deposits is layered bedrock, mainly dolomite of Silurian age with small amounts of the Maquoketa Shale Group in the north central part of the county. The thickness of the glacial deposits over the bedrock varies between 0 and 200 feet, with bedrock outcropping south of Naperville, near Elmhurst, and along the Des Plaines River. The thickest glacial

deposits occur where the West Chicago and Valparaiso Moraines cross buried bedrock valleys. In the vicinity of the project site, these unconsolidated deposits vary between 100 and 200 feet in thickness (reference 5).

The unconsolidated deposits of DuPage County may be grouped as till, glacial sand and gravel, glacial lake and wind-blown deposits, and recent deposits. Till comprises about 75 percent of the geologic materials which have been mapped within 20 feet of the surface. All the tills belong to the Wedron Formation, which consists of the Tiskilwa, Malden, Yorkville, Haeger, and Wadsworth Till Members.

Stratigraphy of the Chicago area is presented in APPENDIX 1.

3.3 Site Foundation Conditions

Soil conditions at the UST site are shown in Figure 4. Stratigraphy as observed during excavation consists of a concrete floor atop gravel/sand over brown clay with medium stone becoming brown clay with stone at approximately a depth of 5 feet.

Backfill material surrounding the former UST, and adjacent to the building footings and flooring was clean, fine to medium grained brown sand.

3.4 Hydrology/Hydrogeology

The surface and groundwater hydrogeology is greatly influenced by artificial drainage methods due to the high density of commercial and residential building throughout the area. Surface drainage is controlled by either direct overland flow or storm sewer discharge. The subject property has a naturally occurring creek (St. Joseph's Creek) which dissects the northern property boundary.

The water table roughly parallels the surface topography in northeastern Illinois, rising under uplands and intersecting the ground surface along perennial streams, lakes, swamps, and springs. At these points, groundwater is discharged to surface water bodies by gravity flow. The water table can be found in any of the surface materials found in northeastern Illinois. Groundwater is currently the primary source of DuPage County's water supply. It is developed from primarily two aquifer systems - one shallow and one deep. The shallow system is comprised of dolomite rocks of Silurian age, dolomite beds in the Maquoketa Formation, and sand and gravel deposits in the glacial drift. The deep aquifers are composed of sandstone and dolomite formations of the Cambrian and

MAY NOT BE TRUE TODAY ?

CITY WATER (LAKE MICH.)

Ordovician ages. The Ironton-Galesville Sandstone is the principal water-yielding zone in the deep aquifer. The Silurian dolomite aquifer is the most heavily developed source of groundwater in DuPage County. Sand and gravel drift aquifers are present in large areas of the county, occurring immediately above the bedrock at the base of the drift and forming the most widespread drift aquifers which are known to occur over approximately 75 percent of the eastern two-thirds of the county. A major portion of the basal drift aquifers are in hydrologic connection with the shallow dolomite aquifer so that they complement the dolomite and contribute to its productivity. The drift and Silurian dolomite aquifers are separated from the deep sandstone aquifers by the shales of the Maquoketa Formation. The occurrence of superficial sand and gravel aquifers is limited to areas along the major stream valleys and to the northeastern part of the county.

General groundwater movement in the vicinity of the former UST is presumed to be the same as surface runoff, which is generally to the north towards St. Joseph Creek. Surface water flows northward through the swale situated immediately to the north side of the Arrow Gear building (the swale was partially backfilled to accommodate erosion barriers along the creek flow). The swale is the primary diversion route for runoff within the industrial park in the area of Arrow Gear. Flow is from approximately El. 700 at the site of the former UST, to El. 685± at St. Joseph Creek located approximately 200 feet away to the north. St. Joseph Creek flows in a west northwest direction exiting into the East Branch DuPage River. Corrective action extended to a depth of approximately 7 feet throughout the excavation area. Groundwater was not encountered within this depth of excavation.

Groundwater in the superficial soils deposits is not exploited for domestic use. Water wells in the UST area extend to the basal sand and gravel, and dolomite aquifer located between 100 and 200 feet below ground surface. It is unlikely that the UST release at the Arrow Gear site affected this aquifer.

According to Illinois State Water Survey and Illinois State Geologic Survey water well records for DuPage County, there are approximately 897 private and commercial water wells which exist in Township 38N, Range 10E, Sections 1, 2, 11, 12, 13, 14, and Township 38N, Range 11E, Sections 6,7,18. No water wells were shown to exist within a 500 foot radius of the site. Approximately forty-five wells exist within a 3,000 foot radius of the site with the nearest well located to the north/northeast approximately 900 feet from the site. Considering the UST release was confined to the UST backfill materials and the area surrounding the site has naturally occurring brown clay and glacial till soils with typical

permeability of $1x10^{-4}$ cm/sec., it is unlikely that existing wells in the area would be affected by the petroleum product release at this site. Water well locations are plotted on FIGURE 5 and water well records are presented in APPENDIX 7.

4.0 Corrective Actions

4.1 Release Abatement Measures

The one 1,000 gallon UST has existed at the Arrow facility since approximately October, 1966. Until the excavation and removal of the UST for the purpose of expanding the heat treatment department, Arrow had no knowledge of a UST release. As such, the quantity of product released, spilled, or overfilled at the UST site is undetermined. The removal and proper disposal of the 1,000 gallon UST has eliminated the possibility of any future release of contaminants. The release was limited to the UST backfill materials only. The subsequent excavation and disposal of the approximately 45 cubic yards of backfill material has eliminated the source of contamination in the UST area.

4.2 Soil Removal

Soils surrounding the UST as backfill were excavated by ALL Earth on March 11, 1993. The soils were excavated, moved to the parking lot area and placed on plastic sheeting. Upon completion of the entire excavation of the former UST tank bed area, the contaminated soils (approximately 45 cubic yards) were loaded into ALL Earth trucks and transported to the EnvironTech landfill facility in Morris, Illinois for proper disposal. Special Waste Manifests are included in Appendix 2.

4.3 Actions to Mitigate Further Release/Hazards

Arrow had no knowledge of a release prior to excavation/removal of the 1,000 gallon UST. Upon discovery of the release, Mr. James Pielsticker, Vice President of Arrow, reported the release to IEMA on January 21, 1993 whereupon the release was classified as Incident # 930214. The UST was removed on January 20, 1993 and all contaminated soils were removed as a special waste solid to the EnvironTech landfill facility on March 11, 1993. Free product was never observed during these actions and groundwater was never encountered.

The removal of the UST and disposal of the surrounding contaminated soils has mitigated potential further release and hazards.

5.0 Analytical Results

An initial sample (A-1) for laboratory analysis was acquired from a heavily stained area of the former UST tank bed on February 12, 1992. This sample was analyzed for BTEX compounds, PNA's, and TCLP Metals. Results of this analyzation are depicted in TABLE 5.1. Results indicated that all parameters were non detectable with the exception of chrysene. However, the level of chrysene was still below the generic cleanup objective. It appears that TCLP metals are not a factor to be considered at this site and because this analyzation is not required in the IEPA cleanup generic cleanup objectives for "Other Petroleum Substances", this parameter will not be tested in future sampling.

Generic cleanup objective validation soil sampling was performed on the excavation sidewalls at a height above the bottom of the tank equal to approximately one third the tank's diameter (Samples N-1, S-1, E-1, W-1). Samples from the excavation invert were acquired directly beneath both ends of the former tank location (Samples I-1, I-2). This sampling was conducted on March 11, 1993 after the contaminated UST backfill material was removed for disposal. The laboratory supplied glass sample jars and teflon caps were utilized as a scoop for the soils. Jars were filled so that zero headspace existed in each sample and placed in an ice chest for transport to Quality Analytical Labs. Proper chain of custody sheets were filled out and are included with the laboratory data sheets in Appendix 3.

Laboratory results indicate that BTEX parameters and PNA's are all well below IEPA generic cleanup objectives with the exception of Carcinogenic PNA's. Analysis indicates the low level presence of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene still exist at the site.

TABLE 5.1 SUMMARY OF ANALYSIS FOR INITIAL SAMPLE # A-1

Parameter	PQL[1] mg/kg	IEMA Cleanup[2] Objective mg/kg	SAMPLE # A-1 Analysis mg/kg
BTEX (Method: SW-846 8260 (modified))			
Benzene	0.005	0.005	ND
Toluene	0.005	-	ND
Ethylbenzene	0.005	-	ND
Xylenes	0.005	-	ND
TOTAL BTEX[3]	0.011	11.705	<0.011
PNA's (Method: SW-846 8310 HPLC)			
Naphthalene	0.0050	0.0250	<0.0050
Acenaphthene	1.2500	0.4000	ND
Anthracene	0.0050	43.0000	ND
Fluoranthene	0.0050	0.0400	ND
Fluorene	0.1400	0.0400	ND
Pyrene	0.1000	4.2000	ND
Total Other Non-Carc.[4]	1.1710	4.2000	ND
Benzo(a)anthracene	0.0007	0.0026	<0.0007
Benzo(a)pyrene	0.0150	0.0040	<0.0150
Benzo(b)fluoranthene	0.0110	0.0026	<0.0110
Benzo(k)fluoranthene	0.0110	0.0026	<0.0110
Chrysene	0.1000	0.2500	<0.1000
Dibenzo(a,h)anthracene	0.0300	0.0040	<0.0300
Indeno(1,2,3-cd)pyrene	0.0300	0.0026	<0.0300
TCLP Metals (Methods: SW-846 6010, 7470)			
Arsenic	0.0150	0.0050	ND
Barium	0.1000	2.0000	1.0000
Cadmium	0.1000	0.0050	<0.1000
Chromium (total)	0.1000	0.1000	ND
Lead	0.0013	0.0075	ND
Mercury	0.0005	0.0020	<0.0005
Selenium	0.0050	0.0050	ND

ND = Not Detected at or Above the PQL.
(1) PQL = Practical Quantitation Limit
(2) Soil Cleanup Objectives as outlined in LUSTCOG HIGHLY/LOW PRIORITY GUIDE - SOIL SAMPLING REQUIREMENTS dated February 1993.
(3) TOTAL BTEX is the sum of Benzene, Toluene, Ethylbenzene, and Xylenes.
(4) Total Other Non-Carcinogenics includes the sum of Acenaphthylene, Benzo(g,h,i)perylene, and Phenanthrene.

TABLE 5.2 SUMMARY OF CLEANUP OBJECTIVE SAMPLING ANALYSIS

Parameter	PQL[1] mg/kg	TACO Cleanup[2] Objective mg/kg	SAMPLE # B-1 Analysis mg/kg	# B-1	# B-1	# B-1	# I-1	# I-2
Benzene	0.002	0.030	0.003	ND	ND	ND	0.003	0.001
Toluene	0.002	-	0.018	0.007	0.002	0.006	0.018	0.018
Ethylbenzene	0.002	-	0.003	ND	ND	0.003	ND	0.004
Xylenes	0.006	-	0.019	ND	ND	ND	0.009	0.021
TOTAL BTEX[3]	0.011	11.700	0.040	<0.016	<0.018	<0.016	<0.033	0.045
PNA's								
Naphthalene	0.0660	0.0280	<0.6600	<0.6600	<0.6600	<0.6600	<0.6600	<0.6600
Acenaphthene	1.3000	0.4400	ND	ND	ND	ND	ND	0.6700
Anthracene	0.6600	43.0000	ND	ND	ND	ND	ND	ND
Fluoranthene	0.6600	0.6000	ND	ND	ND	ND	ND	ND
Fluorene	0.1000	0.6000	ND	ND	ND	ND	ND	ND
Pyrene	0.1000	4.3000	ND	ND	ND	ND	ND	ND
Total Other Non-Carc.[4]	1.3710	4.3000	ND	ND	ND	ND	ND	<1.3818
Benzo(a)anthracene	0.0007	0.0026	0.1300	0.0210	<0.0007	0.0130	0.0110	0.0060
Benzo(a)pyrene	0.0158	0.0066	0.0670	0.0110	<0.0158	0.0170	<0.0158	0.0230
Benzo(b)fluoranthene	0.0110	0.0026	0.0300	0.0120	<0.0110	0.0100	0.0170	0.0300
Benzo(k)fluoranthene	0.0110	0.0026	0.0200	0.0120	<0.0110	<0.0116	<0.0110	<0.0110
Chrysene	0.1000	0.2000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000
Dibenzo(a,h)anthracene	0.0200	0.0066	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Indeno(1,2,3-cd)pyrene	0.0270	0.0026	<0.0270	<0.0270	<0.0270	<0.0270	<0.0270	<0.0270

ND = Not Detected at or above the PQL.
(1) PQL = Practical Quantitation Limit
(2) Soil Cleanup Objectives as outlined in TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES AND SOIL SAMPLING REQUIREMENTS dated February 1993.
(3) TOTAL BTEX is the sum of Benzene, Toluene, Ethylbenzene, and Xylenes.
(4) Total Other Non-Carcinogenics includes the sum of Acenaphthylene, Benzo(g,h,i)perylene, and Phenanthrene.

6.0 Recommended Further Action

Low concentrations of Carcinogenic PNA's found in the cleanup validation samples at the former UST site are considered to present a negligible environmental risk to groundwater and human health. Potential contact with these contaminants is extremely remote, as the area in question is located within the manufacturing facility and will be covered by concrete flooring or the new heat treatment furnace to be installed in the former UST site. As such, IEPA is requested to establish site specific cleanup objectives for Carcinogenic PNA's, and grant Arrow Gear Company LUST site closure.

8.0 References

1. The Illinois Environmental Protection Agency publication "LEAKING UNDERGROUND STORAGE TANK MANUAL" (IEPA/LPC/91-203) dated Fall 1991.

2. The Illinois Environmental Protection Agency publication "LEAKING UNDERGROUND STORAGE TANK - SOIL SAMPLING REQUIREMENTS" dated February 1993.

3. The " IEPA Leaking Underground Storage Tank Program 45-Day Report", submitted March 5, 1993.

4. "Geology for Planning in Northeastern Illinois, VIII. Regional Summary", John P. Kempton, Jean E. Bogner, and Keros Cartwright; Open File Series 1977-2; Illinois State Geological Survey, Urbana, Illinois; May 1, 1977.

5. "Geology for Planning in Northeastern Illinois, VII. Geology for Planning in DuPage County", S.M. Taylor and R.H. Gilkeson; Open File Series 1977-1; Illinois State Geological Survey, Urbana, Illinois; February 3, 1977.

6. The Chicago House Hunt Book, Chicago Sun Times, 1990 Edition.

7. Wheaton Quadrangle, Illinois - DuPage County, 7.5 Minute Topographic Series, U.S. Geologic Survey, 1962; Photorevised 1972 and 1980

ARROW GEAR COMPANY

DATE: 3/24/93

FAX COVER FORM

Please deliver the following to:

NAME: DANA ROSE

FIRM: ADEPT ENVIRONMENTAL SOLUTIONS, INC.

TELECOPIER# 352-9322

FROM:

Sender's Name: M. CERVINKA

We are transmitting 4 pages, which includes this form.

Our Fax Number is: (708) 969-0253
Our Phone Number is: (708) 969-7640

2301 Curtiss Street, Downers Grove, IL 60515

DANA,

YOUR REPORT LOOKS GOOD. I'M FAXING JUST THE PAGES THAT HAVE CORRECTIONS.

THE REPORT NAMES JAMES PIELSTICKER, TWICE, AS THE PERSON WHO PHONED IN THE LUST, IT WAS ACTUALLY MYSELF WHO CALLED. IT REALLY DOESN'T MATTER TO ME WHOSE NAME IS USED, I JUST WANTED TO CLARIFY.